

Electric Energy Chart Questions

You had time today to solve 1 or more of these in group situations. You will find the worked solutions hanging on chart paper around the classroom. Here is the complete list if you wish to go through them (not a bad idea ;)

Note: $\mu = 10^{-6}$ **mass of electron = 9.1×10^{-31} kg** **mass of proton = 1.67×10^{-27} kg**

Coulomb's law

1. What is the force of attraction between a proton and an electron in a hydrogen atom if they are 5.00×10^{-11} m apart? [**Fe = 9.2×10^{-8} N**]
2. One electron has a mass of 9.1×10^{-31} kg. how many coulombs of charge would there be in 1 kg of electrons? How much force would this charge exert on another 1 kg of electrons 1.0 km away? (this is strictly imaginary by the way!) [**1.8×10^{11} C, 2.8×10^{26} N**]
3. Two small spheres are located 0.50 m apart. Both have the same charge on them. If the repulsive force is 5.0 N, what charge is on the spheres, in μC ? [**12 μC**]
4. Three charged objects are located at the 'corners' of an equilateral triangle with sides 1.0 m long. Two of the objects carry a charge of 5.0 μC each. The third object carries a charge of -5.0 μC . What is the resultant force acting on the -5.0 μC object? Assume all 3 objects are very small [**0.39 N towards the middle of the line connecting two +ve charges**]
5. Imagine you could place 1 g of electrons 1.0 m away from another 1 g of electrons. Calculate what would be
 - a) the **electrical** force of repulsion between the 2 collections of charge [**2.9×10^{26} N**]
 - b) the **gravitational** force of attraction between them [**6.7×10^{-17} N**]
 - c) the ratio of the electrical force to the gravitational force. [**4.3×10^{42}**]

Electric Field and Electric Potential

6. A +36 μC charge is 0.80 m away from a +108 μC charge. What is the magnitude and direction of the electric field at a point midway between the 2 charges? [**4.0×10^6 N/C towards the 36 μC charge**]
7. At what rate will a proton accelerate in an electric field of strength 1.0×10^3 N/C? [**9.6×10^{10} m/s²**]